

SEQUENCE LISTING

<111> Brett A. Monia
Lex M. Cowser
Jude Murray
Mandy Butler
Nick Dean

<120> ANTISENSE MODULATION OF HIV-1 EXPRESSION

<130> ISPH-0519

<160> 73

<210> 1

<211> 6372

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (43)..(2217)

<400> 1

tacaaaccagg ctcaactggt gcctggttagc agatttgcaa ac atg agt gct gag 54
Met Ser Ala Glu
1

ggg tac cag tac aga gcg ctg tat gat tat aaa aag gaa aga gaa gaa 102
Gly Tyr Gln Tyr Arg Ala Leu Tyr Asp Tyr Lys Lys Glu Arg Glu Glu
5 10 15 20

gat att gac ttg cac ttg ggt gac ata ttg act gtg aat aaa ggg tcc 150
Asp Ile Asp Leu His Leu Gly Asp Ile Leu Thr Val Asn Lys Gly Ser
25 30 35

tta gta got ctt gga ttg agt gat gga cag gaa gcc agg cct gaa gaa 198
Leu Val Ala Leu Gly Phe Ser Asp Gly Gln Glu Ala Arg Pro Glu Glu
40 45 50

att ggc tgg tta aat ggc tat aat gaa acc aca ggg gaa agg ggg gac 246
Ile Gly Trp Leu Asn Gly Tyr Asn Glu Thr Thr Gly Glu Arg Gly Asp
55 60 65

ttt ccg gga act tac gta gaa tat att gga agg aaa aaa atc tgg cct 294
Phe Pro Gly Thr Tyr Val Glu Tyr Ile Gly Arg Lys Lys Ile Ser Pro
70 75 80

ccc acc cca aag ccc cgg cca cct cgg cct ctt cct gtt gaa cca ggt 342
Pro Thr Pro Lys Pro Arg Pro Pro Arg Pro Leu Pro Val Ala Pro Gly
85 90 95 100

tct tgg aaa act gaa gaa gat gtt gaa caa caa gct ttg act ctc ccg 390
Ser Ser Lys Thr Glu Ala Asp Val Glu Gln Gln Ala Leu Thr Leu Pro
105 110 115

gat ctt gaa gag cag ttt gcc cct cct gac att gcc ccg cct ctt ctt 438

Asp	Leu	Ala	Gln	Gln	Phe	Ala	Pro	Pro	Asp	Ile	Ala	Pro	Pro	Leu	Leu	
121			121				123						131			
atc	aag	ctc	gtg	gaa	gac	act	gaa	aag	aaa	agt	ctg	gaa	tgt	cca	act	480
Ile	Lys	Leu	Val	Glu	Ala	Ile	Gln	Lys	Lys	Gly	Leu	Gln	Cys	Ser	Thr	
133		133					140					145				
cca	tac	aga	aca	cag	agg	ccc	agg	aac	ctg	gca	gaa	ttc	cga	cag	ctt	534
Leu	Tyr	Arg	Thr	Gln	Ser	Ser	Ser	Asn	Leu	Phe	Gln	Leu	Arg	Gln	Leu	
151						155					160					
ctt	gat	tgt	gat	aca	ccc	ccc	gtg	gac	ttg	gaa	atg	atc	gat	gtg	cac	582
Leu	Asp	Cys	Asp	Thr	Pro	Ser	Val	Asp	Leu	Gln	Met	Ile	Asp	Val	His	
165					170					175					180	
ggt	ttg	gct	gac	gct	ttc	aaa	ggc	tat	ctc	ctg	gac	ttc	cca	aat	ccc	630
Val	Leu	Ala	Asp	Ala	Phe	Lys	Arg	Tyr	Leu	Leu	Asp	Leu	Pro	Asn	Pro	
			185						190					195		
gtc	att	cca	gca	gac	gtt	tac	agt	gaa	atg	att	tct	ttc	gct	cca	gaa	678
Val	Ile	Pro	Ala	Ala	Val	Tyr	Ser	Glu	Met	Ile	Ser	Leu	Ala	Pro	Glu	
			200					205					210			
gta	caa	agg	ccc	gaa	gaa	tat	att	cag	cta	ttg	aag	aag	ctt	att	agg	726
Val	Gln	Ser	Ser	Glu	Glu	Tyr	Ile	Gln	Leu	Leu	Lys	Lys	Leu	Ile	Arg	
		215					220					225				
tgg	ccc	agg	ata	ccc	cat	cag	tat	tgg	ctt	acg	ctt	cag	tat	ttg	ttc	774
Ser	Pro	Ser	Ile	Pro	His	Gln	Tyr	Trp	Leu	Thr	Leu	Gln	Tyr	Leu	Leu	
	230					235					240					
aaa	cat	ttc	ttc	aag	ctc	tct	caa	acc	ccc	agg	aaa	aat	ctg	ttg	aat	822
Lys	His	Phe	Phe	Lys	Leu	Ser	Gln	Thr	Ser	Ser	Lys	Asn	Leu	Leu	Asn	
245					250					255					260	
gca	aga	gta	ctc	tct	gaa	att	ttc	agg	ccc	atg	ctt	ttc	aga	ttc	tca	870
Ala	Arg	Val	Leu	Ser	Glu	Ile	Phe	Ser	Pro	Met	Leu	Phe	Arg	Phe	Ser	
			265						270					275		
gca	gac	agg	tct	gat	aat	act	gaa	aac	ctc	ata	aaa	ggt	ata	gaa	att	918
Ala	Ala	Ser	Ser	Asp	Asn	Thr	Glu	Asn	Leu	Ile	Lys	Val	Ile	Glu	Ile	
			280					285					290			
tta	atc	tca	act	gaa	tgg	aat	gaa	cga	cag	ccc	gca	cca	gca	ctg	ccc	966
Leu	Ile	Ser	Thr	Glu	Trp	Asn	Glu	Arg	Gln	Pro	Ala	Pro	Ala	Leu	Pro	
		295					300					305				
ccc	aa	cca	cca	aaa	ccc	act	act	gta	gac	aac	aac	ggc	atg	aat	aac	1014
Pro	Lys	Pro	Pro	Lys	Pro	Thr	Thr	Val	Ala	Asn	Asn	Gly	Met	Asn	Asn	
	310					315					320					
aat	atg	ccc	ttc	caa	aat	gct	gaa	tgg	tac	tgg	gga	gat	atc	tgc	agg	1062
Asn	Met	Ser	Leu	Gln	Asn	Ala	Glu	Trp	Tyr	Trp	Gly	Asp	Ile	Ser	Arg	
325					330					335					340	
gaa	gaa	gtg	aat	gaa	aaa	ccc	cga	gat	ata	gca	gac	ggg	acc	ttt	ttg	1110
Glu	Gln	Val	Asn	Glu	Lys	Leu	Arg	Asp	Thr	Ala	Asp	Gly	Thr	Phe	Leu	
			345						350					355		

gta cga gat ggg tct act aaa atg cat ggg gat tat act gtt aca cta	1188
Val Arg Asp Ala Ser Thr Lys Met His Gly Asn Tyr Thr Leu Thr Leu	
381	
agg aaa ggg gga aat aac aaa tta atc aaa ata ttt cat cga gat ggg	1206
Arg Lys Gly Gly Asn Asn Lys Leu Ile Lys Ile Phe His Arg Asp Gly	
378	
380	
aaa tat ggg ttc tct gac cca tta acc ttc agt cct ggg gtt gaa cta	1284
Lys Tyr Gly Phe Ser Asp Pro Leu Thr Phe Ser Ser Val Val Glu Leu	
391	
395	
400	
ata aac cac tac cgg aat gaa tct cta gct cag cat aat ccc aaa ttg	1302
Ile Asn His Tyr Arg Asn Glu Ser Leu Ala Gln Tyr Asn Pro Lys Leu	
405	
410	
415	
420	
gat gtc aaa tta ttc tat cca gta tcc aaa tac caa cag gat caa gtt	1380
Asp Val Lys Leu Leu Tyr Pro Val Ser Lys Tyr Gln Gln Asp Gln Val	
425	
430	
435	
gtc aaa gaa gat aat att gaa gct gta ggg aaa aaa tta cat gaa tat	1398
Val Lys Glu Asp Asn Ile Glu Ala Val Gly Lys Lys Leu His Glu Tyr	
440	
445	
450	
aac act cag ttt caa gaa aaa agt cga gaa tat gat aga tta tat gaa	1446
Asn Thr Gln Phe Gln Glu Lys Ser Arg Glu Tyr Asp Arg Leu Tyr Glu	
455	
460	
465	
gaa tat acc cgg aca tcc cag gaa atc caa atg aaa agg aca gct att	1494
Glu Tyr Thr Arg Thr Ser Gln Glu Ile Gln Met Lys Arg Thr Ala Ile	
470	
475	
480	
gaa gca ttt aat gaa acc ata aaa ata ttt gaa gaa cag tgc cag acc	1542
Glu Ala Phe Asn Glu Thr Ile Lys Ile Phe Glu Glu Gln Cys Gln Thr	
485	
490	
495	
500	
caa gag cgg tac agt aaa gaa tac ata gaa aag ttt aaa cgt gaa ggc	1590
Gln Glu Arg Tyr Ser Lys Glu Tyr Ile Glu Lys Phe Lys Arg Glu Gly	
505	
510	
515	
aat gag aaa gaa ata caa agg att atg cat aat tat gat aag ttg aag	1638
Asn Glu Lys Glu Ile Gln Arg Ile Met His Asn Tyr Asp Lys Leu Lys	
520	
525	
530	
tct cga atc agt gaa att att gac agt aga aga aga ttg gaa gaa gac	1686
Ser Arg Ile Ser Glu Ile Ile Asp Ser Arg Arg Arg Leu Glu Glu Asp	
535	
540	
545	
ttg aag aag cag gca gct gag tat cga gaa att gac aaa cgt atg aac	1734
Leu Lys Lys Gln Ala Ala Glu Tyr Arg Glu Ile Asp Lys Arg Met Asn	
550	
555	
560	
agg att aaa cca gac ttt att cag ctg aga aag acg aga gac caa tac	1782
Ser Ile Lys Pro Asp Leu Ile Gln Leu Arg Lys Thr Arg Asp Gln Tyr	
565	
570	
575	
580	
ttg atg tgg ttg act caa aaa ggg gtt cgg caa aag aag ttg aac gag	1830
Leu Met Trp Leu Thr Gln Lys Gly Val Arg Gln Lys Lys Leu Asn Glu	
585	
590	
595	

tgg tgg ggc aat gaa aac aat gaa gac caa tat tca ctg ggg gaa gat	1878
Thr Leu Gly Asn Glu Asn Thr Glu Asg Gln Tyr Ser Leu Val Glu Asp	
611 612 613	
gat gaa gat tgg ccc cat cat gat gag aag aca tgg aat gtt gga agc	1926
Asp Glu Asp Leu Pro His His Asp Glu Lys Thr Tyr Asn Val Gly Ser	
618 619 620 621 622	
agg aar cga aac aaa gct gaa aac ctg ttg cga ggg aag cga gat ggc	1974
Ser Asn Arg Asn Lys Ala Glu Asn Leu Leu Arg Gly Lys Arg Asp Gly	
631 632 633 634 635 636 637 638 639	
aat ttt ctt gtc cgg gag ago agt aaa cag ggc tgc tat gcc tgc tct	2022
Thr Phe Leu Val Arg Glu Ser Ser Lys Gln Gly Cys Tyr Ala Cys Ser	
645 646 647 648 649 650 651 652 653 654	
gta gtg gtg gac ggc gaa gta aag cat tgt gta ata aac aaa aca gca	2070
Val Val Val Asp Gly Glu Val Lys His Cys Val Ile Asn Lys Thr Ala	
655 656 657 658 659 660 661 662 663 664	
aat ggc tat ggc ttt gcc gag ccc tat aac ttg tac ago tct ctg aaa	2118
Thr Gly Tyr Gly Phe Ala Glu Pro Tyr Asn Leu Tyr Ser Ser Leu Lys	
680 681 682 683 684 685 686 687 688 689	
gaa ctg gtg cta cat tac caa cac acc tcc ctt gtg cag cac aac gac	2166
Glu Leu Val Leu His Tyr Gln His Thr Ser Leu Val Gln His Asn Asp	
695 700 705	
tcc ctg aat gtc aca cta gcc tac cca gta tat gca cag cag agg cga	2214
Ser Leu Asn Val Thr Leu Ala Tyr Pro Val Tyr Ala Gln Gln Arg Arg	
710 715 720	
tga agggattact ccttgatctt tctctgaag tttagcacc ctgaggctc	2267
725	
tggaaagcaa agggctcttc tttagctga ttgtgaatt gagctgcaga aacgaagcaa	2327
tttttttttg gatgggacta gagtttttct ttacaaaaaa gaagtagggg aagacatgca	2387
gctaaggct gtatgatgac cacacgttcc taagctggag tgcttatccc ttttttttct	2447
tttttttttt ggtttaattt aaagccacaa ccacatacaa cacaaagaga aaaagaaatg	2507
caaaaaatct tggtgcagg gacaaagagg cttttaacca tgggtgcttg taatgcttct	2567
tgaagcttta ccagctgaaa gttgggactc tggagagagg aggagagaga ggcagaagaa	2627
ccctggcttg agaaggcttg gtcagcttg gtttagcttg gatgttgctg tgcaggctg	2687
accagacac atgcactgt ggattatttc attttgtaac aaatgaacga tatgtagcag	2747
aaaggcaggt ccactcacia gggagctttt gggagaatgt cagttcatgt atgttcagaa	2807
gaaattctgt catagaaaagt gccagaaaagt gtttaacttg tcaaaaaaca aaaaaccaga	2867
aaacgaaaaa tggagtttgg aaacacaggc ttaaaatgac attcagtata taaaatatgt	2927
acataatatt gcatgactaa ccatcaaaa gatggatttg catcaatacc aaatagcttc	2987

```

tggtttggtt  tggtyaaggt  taattcaca  gggtatgca  attttatct  ttatcctaagt  3147
tggtatttca  gttctaaatg  taattcaga  atangcttc  ccccccttg  ttttggttgt  3157
tgaaaaatatt  gttgtccctg  atttttgta  atattcatt  ttgttatct  tttttaaaaa  3167
taaatgtaca  ggatgcccgt  aaaaaaaaaa  atgggttcag  aattaaaaat  atgaaatata  3227
ttacagtttt  tttgttacag  agtaactgt  gttagccaa  ggttaaaaaa  ttcaataacag  3287
atttttttg  gactgttttg  ttgggcagtg  cctgataag  ttcaagctg  ctttatcaa  3347
taaaaaaaaa  accgaattc  actgg  3372

```

<210> 1

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<221> PCR Primer

<400> 2

agcaacctgg cagaattacg a

21

<210> 3

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<221> PCR Primer

<400> 3

taaaacgtgc acatgatca t

21

<210> 4

<211> 30

<212> DNA

<213> Artificial Sequence

<211>

<213> PCR Probe

<400> 4

ttcttgattg tgatacacc ccggtggact

30

<210> 5

<211> 19

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 5

gaaggtgaag gtcggagtc

19

<210> 6

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 6

gaagatgggtg atgggatttc

20

<210> 7

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Probe

<411> 7

aaagtttccc gttctcagtc

20

<210> 6

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 6

atcttctttct ctttctctt

18

<210> 9

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 9

gcttctctgtc catcactg

18

<210> 10

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 10

ttcatttggt tctctcgag

18

<210> 11
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 11
tattctggcca ggttgctg 18

<210> 12
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 12
gtaagtorag gagatagc 18

<210> 13
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 13
atttcaactgt aaacggct 18

<210> 14
<211> 18
<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 14

gattgaagaa atgtttta

18

<210> 15

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 15

ggctgctgag aatctgaa

18

<210> 16

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 16

gttcattcca ttcagttg

18

<210> 17

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<410> 17

agtaggtttt ggtaggtt

18

<210> 18

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 18

ttattcatac cgttggtg

18

<210> 19

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 19

attcagcatt ttgtaagg

18

<210> 20

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<410> 21

AccacagAAC tgaaggtt

18

<210> 11

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 11

atttctctggg atgtgogg

18

<210> 12

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 12

aggctctctgg gtctggca

18

<210> 23

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 13

tttctctcttg ccttcacg

18

<210> 14
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 14
atcttttgta ttcttttc 18

<210> 25
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 25
ttcaagtctt ctccaat 18

<210> 26
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 26
attggtctct cgtttttc 18

<210> 17
<211> 18
<212> DNA

<213> Artificial Sequence

<210>

<223> Antisense Oligonucleotide

<400> 17

tcaacttctt ttgcgaa

16

<210> 18

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 28

ttgccaacc actcggtc

18

<210> 29

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 29

gtcttcagtg ttttcatt

18

<210> 30

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 30

cttggttttg gttgctat

18

<210> 31

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 31

cttggtttact gctctccc

18

<210> 32

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 32

ccaccactac agagcagg

18

<210> 33

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 33

ctttctcttg ccgtccac

18

<210> 34

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 34

aaagccatag ccagttgc

18

<210> 35

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 35

acattgaggg agtcgttg

18

<210> 36

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 36

gccttttgtt ttccagag

18

<210> 37
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 37
atcagactgg agaggagc 18

<210> 38
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 38
aaagaaggga taagcact 18

<210> 39
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 39
ctgcctctct ctctctcg 18

<210> 40
<211> 18
<212> DNA

<210> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 40

ccaggctaaa ccaggctg

18

<210> 41

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 41

tgtctggggtc cacctgc

18

<210> 42

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 42

gacgtgcctt tctgctac

18

<210> 43

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<210> Antisense Oligonucleotide

<410> 43

attctcccaa agcgtccc

18

<210> 44

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 44

ttctggcact ttctatga

18

<210> 45

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 45

cttcagcaa aacaaaac

18

<210> 46

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<410> 46

aactgaata acaactta

16

<211> 47

<212> 18

<213> DNA

<213> Artificial Sequence

<220>

<221> Antisense Oligonucleotide

<400> 47

ccaacaaaa agtccaaa

18

<210> 48

<211> 3454

<212> DNA

<213> Mus musculus

<220>

<221> CDS

<222> (575)...(2749)

<400> 48

ggcagcagc gagctggagg aagcagcggc agcggcagcg gcagcggtag cggctgaggac 60
ggctgtgcag ccaaggaacc gggacagcga agcagcggca ggtcgcagct ggatcgcagg 120
agcctgggag ctgggagctt cagagggcgc tgaagcccag gctgggcaga ggaaggaagc 180
gagccgaccc ggaggtgaag ctgagagtgg agcgtggcag taaaatcaga cgacagatgg 240
acagtgtgac aggaacgtca gagaggattg ggccctgcctg cgagagtcag cctggagtca 300
aggtgttgac aagttgtgta gaaggacaag tgggaggaag gtggcgcgcg gagggagagc 360
cctgtcttca gtacccccgt tgatggagga cagatggaca gcagccggac ggccagtcac 420
ctctctttaa cctctggata gtggctcttt gtgtctctgt ggacacctgt tggggattct 480
agccattct ctgaactcac tttctcttaa aacgtaaact cggacggcag tgtgcgagcc 540
agctctctctg tggcagggca ctgagcttgc agac atg agt gca gag ggc tac cag 595

Met Ser Ala Glu Gly Tyr Gln

1

5

tac aga gca ctg tac gac tac aag aag gag cga gag gaa gac att gac 643
Tyr Arg Ala Leu Tyr Asp Tyr Lys Lys Glu Arg Glu Glu Asp Ile Asp

19

10	15	20	
cta cac ctg ggg gac ata ctg act ggg aat aaa ggg tcc tta gtg gca	691		
Leu His Leu Gly Asp Ile Leu Thr Val Asn Lys Gly Ser Leu Val Ala			
35	50	65	
ctt gga ttc agt gat ggc cag gaa gcc cgg cct gaa gat att ggc tgg	739		
Leu Gly Phe Ser Asp Gly Gln Glu Ala Arg Pro Glu Asp Ile Gly Trp			
40	45	50	55
tta aat ggc tac aat gaa acc act ggg gag agg gga gac ttt cca gga	787		
Leu Asn Gly Tyr Asn Glu Thr Thr Gly Glu Arg Gly Asp Phe Pro Gly			
60	65	70	
act tac gtt gaa tac att gga agg aaa aga att tca ccc cct act ccc	835		
Thr Tyr Val Glu Tyr Ile Gly Arg Lys Arg Ile Ser Pro Pro Thr Pro			
75	80	85	
aag cct cgg ccc cct cga ccg ctt cct gtt gct ccg ggt tct tca aaa	883		
Lys Pro Arg Pro Pro Arg Pro Leu Pro Val Ala Pro Gly Ser Ser Lys			
90	95	100	
act gaa gct gac acc gag cag caa ggg tgg ccc ctt cct gac ctg gcc	931		
Thr Glu Ala Asp Thr Glu Gln Gln Ala Leu Pro Leu Pro Asp Leu Ala			
105	110	115	
gag cag ttt gcc cct cct gat gtt gcc ccg cct ctc ctt ata aag ctg	979		
Glu Gln Phe Ala Pro Pro Asp Val Ala Pro Pro Leu Leu Ile Lys Leu			
120	125	130	135
ctg gaa gcc att gag aag aaa gga ctg gaa tgt tgg act cta tac aga	1027		
Leu Glu Ala Ile Glu Lys Lys Gly Leu Glu Cys Ser Thr Leu Tyr Arg			
140	145	150	
aca caa ago tcc ago aac cct gca gaa tta cga cag ctt ctt gat tgt	1075		
Thr Gln Ser Ser Ser Asn Pro Ala Glu Leu Arg Gln Leu Leu Asp Cys			
155	160	165	
gat gcc ggg tca gtg gac ttg gag atg atc gac gta cac gtc tta gca	1123		

Asp Ala Ala Ser Val Asp Leu Gln Met Ile Asp Val His Val Leu Ala	
170 175 180	
gat got ttc aaa ggc tat ctc gcc gac tta cca aat cct gtc att cct	1171
Asp Ala Phe Lys Arg Tyr Leu Ala Asp Leu Pro Asn Pro Val Ile Pro	
185 190 195	
gta got gtt tac aat gag atg atg tct tta gcc caa gaa cta cag agc	1219
Val Ala Val Tyr Asn Gln Met Met Ser Leu Ala Gln Gln Leu Gln Ser	
200 205 210 215	
cct gaa gac tgc atc cag ctg ttg aag aag ctc att aga ttg cct aat	1267
Pro Glu Asp Cys Ile Gln Leu Leu Lys Lys Leu Ile Arg Leu Pro Asn	
220 225 230	
ata cct cat cag tgt tgg ctt acg ctt cag tat ttg ctc aag cat ttt	1315
Ile Pro His Gln Cys Trp Leu Thr Leu Gln Tyr Leu Leu Lys His Phe	
235 240 245	
ttc aag ctc tct caa gcc tcc agc aaa aac ctt ttg aat gca aga gtc	1363
Phe Lys Leu Ser Gln Ala Ser Ser Lys Asn Leu Leu Asn Ala Arg Val	
250 255 260	
ctc tct gag att ttc agc ccc gtg ctt ttc aga ttt cca gcc gcc agc	1411
Leu Ser Glu Ile Phe Ser Pro Val Leu Phe Arg Phe Pro Ala Ala Ser	
265 270 275	
tct gat aat act gaa cac ctc ata aaa ggc ata gag att tta atc tca	1459
Ser Asp Asn Thr Glu His Leu Ile Lys Ala Ile Glu Ile Leu Ile Ser	
280 285 290 295	
agc gaa tgg aat gag aga cag cca gca cca gca ctg ccc ccc aaa cca	1507
Thr Glu Trp Asn Glu Arg Gln Pro Ala Pro Ala Leu Pro Pro Lys Pro	
300 305 310	
ccc aag ccc act act gta gcc aac aac agc atg aac aac aat atg tcc	1555
Pro Lys Pro Thr Thr Val Ala Asn Asn Ser Met Asn Asn Asn Met Ser	
315 320 325	

ttg	cag	gat	ggt	gaa	egg	tac	egg	gga	gac	atc	tca	agg	gaa	gaa	gtg	1603
Leu	Gln	Asp	Ala	Glu	Trp	Tyr	Trp	Gly	Asp	Ile	Ser	Arg	Glu	Glu	Val	
330							335						340			

aat	gaa	aaa	ctc	cga	gac	act	ggt	gat	ggg	acc	ttc	ctg	gta	cga	gac	1651
Asn	Glu	Lys	Leu	Arg	Asp	Thr	Ala	Asp	Gly	Thr	Phe	Leu	Val	Arg	Asp	
345						350					355					

gca	ttc	act	aaa	atg	cac	ggc	gat	tac	act	ctc	aca	ctc	agg	aaa	gga	1699
Ala	Ser	Thr	Lys	Met	His	Gly	Asp	Tyr	Thr	Leu	Thr	Pro	Arg	Lys	Gly	
360					365					370				375		

gga	aat	aac	aaa	tta	atc	aaa	atc	ttt	cac	cgt	gat	gga	aaa	tat	ggc	1747
Gly	Asn	Asn	Lys	Leu	Ile	Lys	Ile	Phe	His	Arg	Asp	Gly	Lys	Tyr	Gly	
				380					385					390		

ttc	ttc	gat	cga	tta	acc	ttc	aac	tct	gtg	gtt	gag	tta	ata	aac	cac	1795
Phe	Ser	Asp	Pro	Leu	Thr	Phe	Asn	Ser	Val	Val	Glu	Leu	Ile	Asn	His	
		395						400					405			

tac	egg	aat	gag	ttc	tta	gct	cag	tac	aac	ccc	aag	ctg	gat	gtg	aag	1843
Tyr	Arg	Asn	Glu	Ser	Leu	Ala	Gln	Tyr	Asn	Pro	Lys	Leu	Asp	Val	Lys	
		410					415					420				

ttg	ctc	tac	cga	gtg	ttc	aaa	tac	cag	cag	gat	caa	gtt	gtc	aaa	gaa	1891
Leu	Leu	Tyr	Pro	Val	Ser	Lys	Tyr	Gln	Gln	Asp	Gln	Val	Val	Lys	Glu	
	425						430					435				

gat	aat	att	gaa	ggt	gta	ggg	aaa	aaa	tta	cat	gaa	tat	aat	act	caa	1939
Asp	Asn	Ile	Glu	Ala	Val	Gly	Lys	Lys	Leu	His	Glu	Tyr	Asn	Thr	Gln	
440					445					450				455		

ttt	caa	gaa	aaa	agt	egg	gaa	tat	gat	aga	tta	tat	gag	gag	tac	acc	1987
Phe	Gln	Glu	Lys	Ser	Arg	Glu	Tyr	Asp	Arg	Leu	Tyr	Glu	Glu	Tyr	Thr	
			460						465				470			

cgt	act	ttc	cag	gaa	atc	caa	atg	aaa	aga	acg	gct	atc	gaa	gca	ttt	2035
Arg	Thr	Ser	Gln	Glu	Ile	Gln	Met	Lys	Arg	Thr	Ala	Ile	Glu	Ala	Phe	
		475						480					485			

aat gaa acc ata aaa ata ttt gaa gaa caa tgc caa acc tag gag cgg	2183
Asn Glu Thr Ile Lys Ile Phe Gln Gln Gln Cys Gln Thr Gln Glu Arg	
481 485 500	
tac agc aaa gaa tac ata gag aag ttt aaa cgc gaa ggc aac gag aaa	2181
Tyr Ser Lys Glu Tyr Ile Glu Lys Phe Lys Arg Glu Gly Asn Glu Lys	
505 510 515	
gaa att caa agg att atg cat aac cat gat aag ctg aag tgc cgt atc	2179
Glu Ile Gln Arg Ile Met His Asn His Asp Lys Leu Lys Ser Arg Ile	
520 525 530 535	
agt gag atc att gac agt agg agg agg ttg gaa gaa gac ttg aag aag	2227
Ser Glu Ile Ile Asp Ser Arg Arg Arg Leu Glu Glu Asp Leu Lys Lys	
540 545 550	
cag gca gct gag tac cga gag atc gac aaa cgc atg aac agt att aag	2275
Gln Ala Ala Glu Tyr Arg Glu Ile Asp Lys Arg Met Asn Ser Ile Lys	
555 560 565	
cgc gac ctg atc cag ttg aga aag aca aga gac caa tac ttg atg tgg	2323
Pro Asp Leu Ile Gln Leu Arg Lys Thr Arg Asp Gln Tyr Leu Met Trp	
570 575 580	
ctg acg cag aaa ggt gtg cgg cag aag aag ctg aac gag tgg ctg ggg	2371
Leu Thr Gln Lys Gly Val Arg Gln Lys Lys Leu Asn Glu Trp Leu Gly	
585 590 595	
aat gaa aat acc gaa gat caa tac tcc ctg gta gaa gat gat gag gat	2419
Asn Glu Asn Thr Glu Asp Gln Tyr Ser Leu Val Glu Asp Asp Glu Asp	
600 605 610 615	
ttg ccc cac cat gac gag aag acg tgg aat gtc ggg agc agc aac cga	2467
Leu Pro His His Asp Glu Lys Thr Trp Asn Val Gly Ser Ser Asn Arg	
620 625 630	
aac aaa gcg gag aac cta ttg cga ggg aag cga gac ggc act ttc ctt	2515
Asn Lys Ala Glu Asn Leu Leu Arg Gly Lys Arg Asp Gly Thr Phe Leu	

635

640

645

gtc cgg gag agc agt aag cag ggc tgc tat gcc tgc tcc gta gtg gta 2663
Val Arg Glu Ser Ser Lys Gln Gly Cys Tyr Ala Cys Ser Val Val Val

650

655

660

gac ggc gaa gtc aag cat tgc gtc att aac aag acc gcc acc ggc tat 2661
Asp Gly Glu Val Lys His Cys Val Ile Asn Lys Thr Ala Thr Gly Tyr

665

670

675

ggc ttt gcc gag ccc tac aac ctg tac agc tcc ctg aag gag ctg gtg 2659
Gly Phe Ala Glu Pro Tyr Asn Leu Tyr Ser Ser Leu Lys Glu Leu Val

680

685

690

695

cta cat tat caa cac acc tcc ctc gtg cag cac aat gac tcc ctc aat 2707
Leu His Tyr Gln His Thr Ser Leu Val Gln His Asn Asp Ser Leu Asn

700

705

710

gtc aca cta gca tac caa gta tat gca caa cag agg cga tga 2749
Val Thr Leu Ala Tyr Pro Val Tyr Ala Gln Gln Arg Arg *

715

720

agcgctggccc tgggacccag ttctccacct tcaagccacc caaggcctct gagaagcaaa 2869
gggctctctt ccagcccgac ctgtgaactg agctgcagaa atgaagccgg ctgtctgcac 2869
atgggaactag agctttcttg gacaaaaaga agtcgggggaa gacacgcagc ctgggaactgt 2929
tggatgacaa gaagttttcta accttatcct cttctctctt ttctttcttt cttctctttt 2989
ctctttcttt cttctctttt ttctttcttt cttcttaatt taaagccaca acacacaaac 3049
aacacacaga gagaaagaaa tgcacaaatc tctccgtgca gggacaaaaga ggcttttaac 3109
catggtgctt gttaacgctt tctgaagctt taccagctac aagttgggac ttgggagacc 3169
agaaggtaga cagggccgaa gagcttgctg ctggggccgc ttggtccagc ctggtgttagc 3229
ctgggtgtcg ctgggtgtgg tgaacccaga cacatcacac tgtggattat ttctttttta 3289
aaagagcgaa tgatatgtat bagagagcgg cgtctgctca cgcaggacac ttgagagaaa 3349
cattgatgca gtctgttggg aggaaaaatg aaacaccaga aaacgttttt gtttaaaact 3409
atcaagtcag caaccaacaa cccaccaaca gaaaaaaaaa aaaaa 3454

<210> 49

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 49

gagtgaggagt aaaatcagac g

21

<210> 50

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Primer

<400> 50

ccacgtgtcc ttctcagcaa

20

<210> 51

<211> 22

<212> DNA

<213> Artificial Sequence

<220>

<223> PCR Probe

<400> 51

tgggcctcgc tgcgagagtc ag

22

<210> 52

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 52

cgtctctcc tccaaactgg

20

<210> 53
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 53
ggctccactc tcagcttcac 20

<210> 54
<211> 10
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 54
ggaatctgtcc tccatcaacg 20

<210> 55
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Antisense Oligonucleotide

<400> 55
ggaactcatgt ctgcagctct 20

<210> 56
<211> 20
<212> DNA
<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 56

cctggccatc actgaatcca

20

<210> 57

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 57

ccagtgggtt cattgtagcc

20

<210> 58

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 58

cattgctgctc cgtgttagct

20

<210> 59

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 59

tctccaagtc cactgacgag

20

<210> 60

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 60

tggggagat agogtttgaa

20

<210> 61

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 61

atactgaagc gtaagccaac

20

<210> 62

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 62

tgggtggtgt ggcgtgtctt

20

<210> 63

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 63

ggtgtaagag tgraatogcc

20

<210> 64

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 64

actgctggta tttggacact

20

<210> 65

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 65

gttctctgggt ttggcattgt

20

<210> 66

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 66

gcatctctcg gtactcagct

20

<210> 67

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 67

gctctcgaca ttccaagttt

20

<210> 68

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 68

ccatagccgg tggcagtctt

20

<210> 69

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 69

tttgcttctc agaggccttg

20

<210> 70

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 71

gggtctccaaa gtcccaactt

20

<210> 71

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 71

gtctggggttc accacaccta

20

<210> 72

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 72

gcataaatgt tctctaaaag

20

<210> 73

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Antisense Oligonucleotide

<400> 73

gccaccgact atgtcttctc

20